Explicable Planning and Replanning for Human-in-the-loop Decision Support

Completed Technology Project (2017 - 2020)

Project Introduction

For the decision support scenarios that are particularly relevant to NASA, such as planning for human space missions, human operators will need a system that can (i) predict the explicability of plans based on their characterizations in the current context, and synthesize explicable plans based on this prediction; generate excuses when an explicable plan does not exist, and produce explanations when parts of the plans are expected to be difficult to understand, (ii) replan when the current solution needs to be updated to incorporate human feedback as a result of changes in the situation, while keeping track of the previously made commitments to the operators. These activities ensure that both planning and replanning are explicable to the operators in the loop, thus facilitating more effective decision support. In this project, we propose to develop a framework to realize explicable automation to work with humans. The proposed framework supports explicable planning and replanning by Recommending Explicable plans that are easily understandable, explaining plan recommendation via excuse and explanation generation, and replanning to Accommodate previous commitments of the human for Decision Support (READS). The system is expected to facilitate natural human-machine interaction, which has broader impacts in a variety of other applications, such as command and control. Hence, the proposed system represents an important step to realize automated systems with humans in the loop.

Anticipated Benefits

Significantly extend the current planning technologies Facilitate more effective decision support Represent an important step to realize automated systems with humans in the loop.

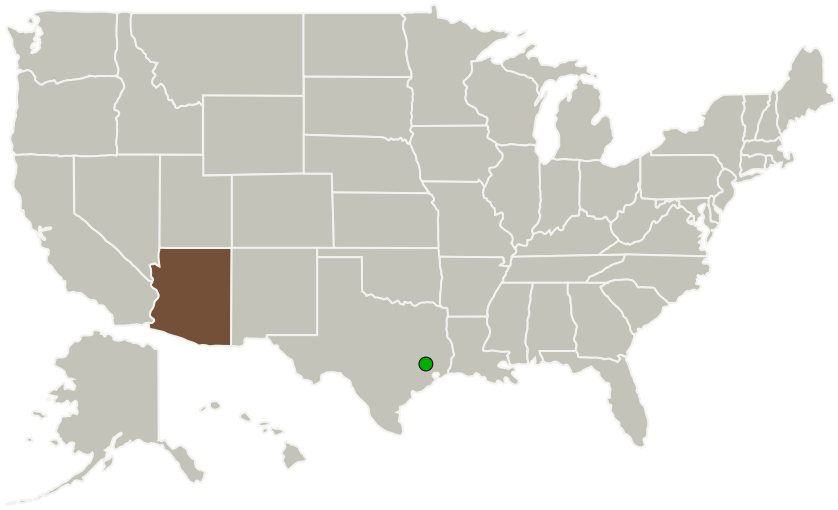
Explicable Planning and Replanning for Human-in-the-loop Decision Support

Table of Contents

Explicable Planning and Replanning for Human-in-the-loop Decision Support

Completed Technology Project (2017 - 2020)

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Arizona State University-Tempe(ASU)	Lead Organization	Academia Alaska Native and Native Hawaiian Serving Institutions (ANNH)	Tempe, Arizona
Johnson Space Center(JSC)	Supporting Organization	NASA Center	Houston, Texas

Primary U.S. Work Locations
Arizona

Project Website:

https://www.nasa.gov/strg#.VQb6T0jJzyE

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Arizona State University-Tempe (ASU)

Responsible Program:

Space Technology Research Grants

Project Management

Program Director:

Claudia M Meyer

Program Manager:

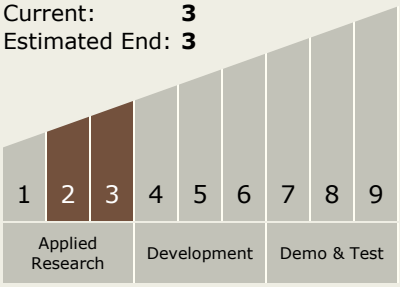
Hung D Nguyen

Principal Investigator:

Subbarao Kambhampati

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



Explicable Planning and Replanning for Human-in-the-loop Decision Support

Completed Technology Project (2017 - 2020)

Technology Areas

Primary:

- TX10 Autonomous Systems
  - TX10.2 Reasoning and Acting
    - TX10.2.2 Activity and Resource Planning and Scheduling

Target Destinations

Earth, The Moon